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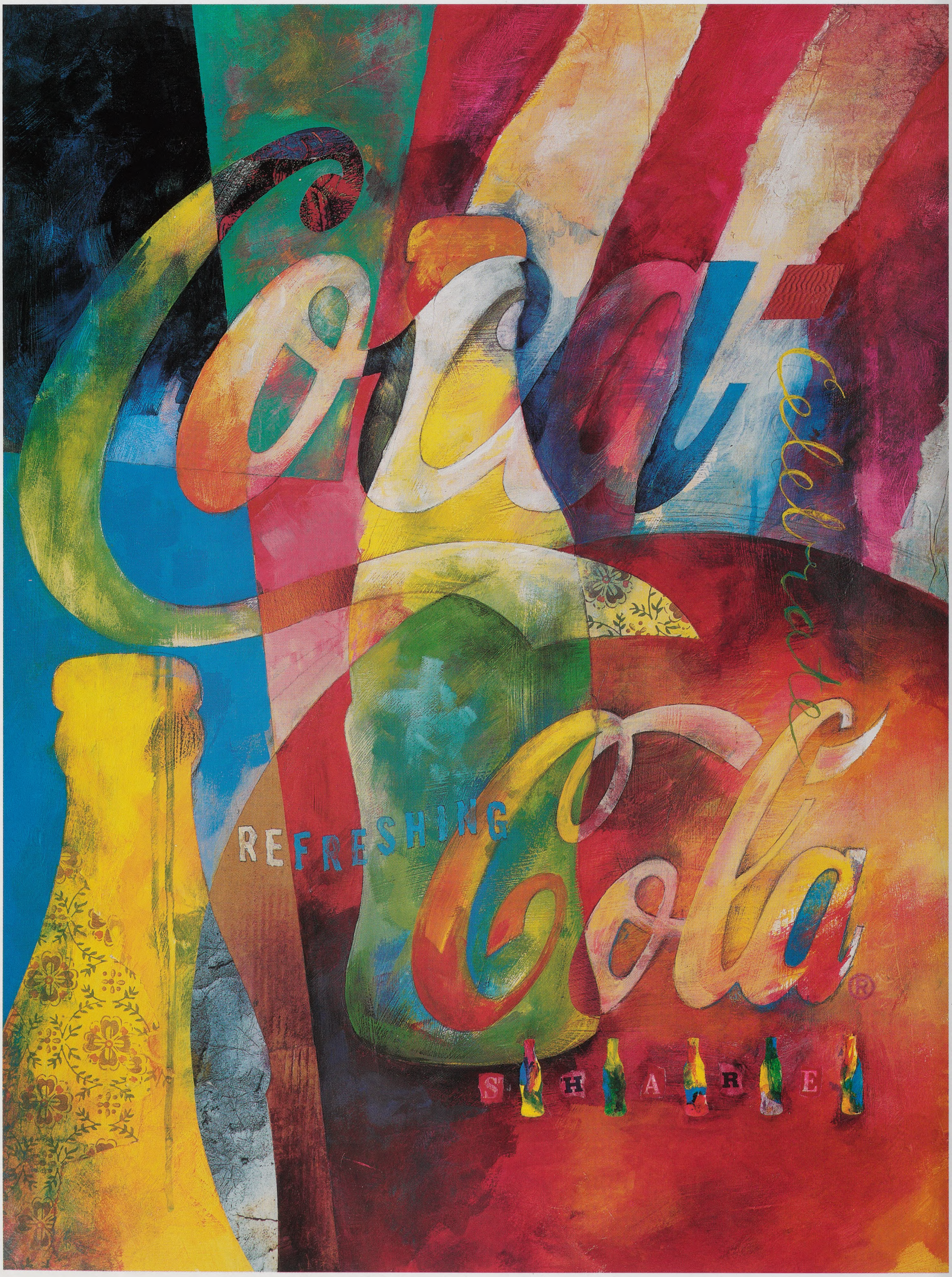
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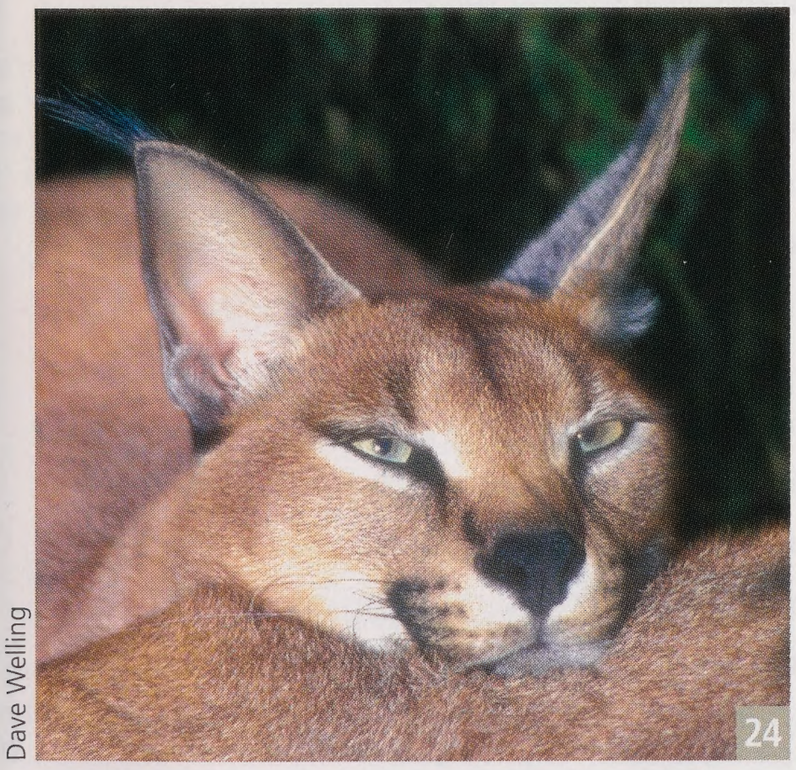
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An Appeal for Pandas

It's hard to believe that five years have passed since giant pandas Tian Tian and Mei Xiang arrived at the Smithsonian's National Zoo—but it is wonderful to be able to celebrate this anniversary with the debut of their first cub, Tai Shan. His birth represents a triumph for National Zoo scientists whose research over the last five years with giant pandas here and in breeding centers in China enabled staff to predict Mei Xiang's estrous period and, when natural mating with Tian Tian failed, to artificially inseminate her at precisely the right time to be successful.

In "Saving Giant Pandas, One Person at a Time" on page 16, Zoo scientists Bill McShea and Melissa Songer describe concurrent efforts to train Chinese conservation biologists and to study pandas, other wildlife, and their habitats in China to further giant panda conservation in the wild. Other research has focused on improving the health and nutrition, as well as the psychological well-being, of giant pandas in zoos, all of which are important to successful reproduction.

From 2000 through 2005, FONZ provided an average of $400,000 a year to support the Zoo's giant panda research and training program. We hope to offer this same level of support for research on pandas in 2006 and beyond. In early November, you will be receiving by mail a plea for contributions to our Giant Panda Conservation Fund so Zoo scientists can continue their efforts to help ensure that giant pandas survive in the wild and in zoos and breeding centers. Among the projects Zoo scientists plan for the next few years are:

- Training and technology transfer to enable Chinese giant panda reserve staff to survey the distribution and abundance of large mammals, including giant pandas, and to map their habitat in reserves. This information is critical for developing and implementing habitat and species conservation and management programs for giant pandas and other threatened species such as the Asiatic black bear.
- Developing new techniques to determine the number of giant pandas in the wild. Counting giant pandas is difficult and dangerous in their remote rugged mountain forests, and estimates of their numbers based on current techniques are highly speculative. Two promising new techniques will be tested. One uses trained dogs to find panda feces, from which DNA can be extracted and analyzed to identify individual animals. The other involves using "camera traps" to take photographs of pandas, then identifying individuals in the photos based on facial and body markings.
- Continuing studies of the reproductive biology of the giant panda, while also providing advanced training to Chinese biologists in techniques for hormone monitoring, artificial insemination, and cryopreservation of sperm and eggs for genome-resource banking. At present, the captive population of giant pandas is not self-sustaining because many animals do not successfully reproduce. Reaching the goal of 300 giant pandas will require better understanding of the species' reproduction and the application of new techniques to enhance reproductive success. This population is both an insurance policy against pandas going extinct in the wild, and a potential source for future reintroductions of pandas to the wild.
- Training Chinese zoo managers to offer enrichment activities for their giant pandas so captive individuals develop normal social and other behaviors. In addition, training will be offered to Chinese zoo managers so that they can train their pandas to accept routine veterinary care and exams and the collection of samples (such as blood) without anesthesia, as we do at the National Zoo.
- Collaborating with Chinese veterinarians to develop a comprehensive preventive medicine program for captive giant pandas that includes disease prevention strategies, disease diagnosis and treatment, and assessment of the causes of cub mortality.

National Zoo scientists have already made amazing progress toward ensuring the survival of giant pandas. They have the ability and the determination to do even more to save this endangered species from extinction. But they need your help to continue their critical work here at the Zoo, where we can look forward to a brother or sister for Tai Shan in the future, and in China, where the ultimate fate of this precious species will be determined. Please consider making a generous donation to the Giant Panda Conservation Fund this holiday season. Your gift will make a difference, for giant pandas and people the world over who love them.

Sincerely,

James M. Schroeder
Executive Director

P.S. You can donate to the Giant Panda Conservation Fund online at **www.fonz.org/gpdonation.htm**.

FONZ Friends of the National Zoo is a nonprofit organization dedicated to supporting the conservation, education, and research efforts of the Smithsonian's National Zoo. Formed in 1958, FONZ was one of the first conservation organizations in the nation's capital. Friends of the National Zoo is dedicated to supporting the National Zoo in a joint mission to study, celebrate, and protect the diversity of animals and their habitats.

ZooGoer [ISSN 0163-416X] is published bimonthly by Friends of the National Zoo (offices located at the Smithsonian's National Zoological Park, 3001 Connecticut Ave., N.W., Washington, D.C., 20008-2537) to promote its aims and programs, and to provide information about FONZ activities to its members, volunteers, and others interested in the purposes of FONZ. Periodicals postage paid at Washington, D.C. Postmaster: Send change of address to *ZooGoer*, 3001 Connecticut Ave., N.W., Washington, D.C., 20008-2537. Copyright ©2005. All rights reserved.

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Membership in FONZ offers many benefits: programs, publications, discounts on shopping and events, free parking, and invitations to special programs and activities to make zoogoing more enjoyable and educational. To join, write FONZ Membership, National Zoological Park, 3001 Connecticut Ave., N.W., Washington, D.C., 20008-2537, call 202.633.3034, or go to www.fonz.org.

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Cover photo: The Smithsonian National Zoo's giant panda cub, Tai Shan, in the Fujifilm Giant Panda Habitat. Photo by Jessie Cohen/NZP.

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Letter from the **Zoo Director**

My Dream Job

As a native Washingtonian, I have visited the Smithsonian's National Zoo every year of my life, so I could not be happier or prouder to begin my dream job as its Director. I was moved to care about conservation by the wonders I beheld here as a child, and I could not be more grateful to all the men and women, past and present, who make the Zoo the special place that it is. I am deeply honored to have been chosen to lead this team. I promise to work my hardest to be worthy of this amazing privilege.

I would also like to recognize and thank Dave Evans for the great job he has done as the Zoo's Interim Director. Working with Deputy Director Mary Tanner and all of the Zoo staff, he has made integrity, accountability, and quality guiding principles. I am committed to keeping the momentum he has built rolling along.

I believe that, with four overarching principles, we can focus our efforts as we strive to become the greatest zoo in the world.

Jessie CohenNZP

- We must do everything within our power to always ensure the best care for all of the creatures entrusted to us.
- We must provide all of our visitors with excellent, informative, and entertaining conservation education experiences.
- We must continue to advance conservation science of the highest quality to benefit both zoo and wild populations of animals.
- We must hold ourselves to the highest standards, and we will practice transparency and accountability in everything we do.

Our grandfathers' and grandmothers' generation heard the conservation call of Teddy Roosevelt—and responded by creating the world's finest system of national parks, wildlife refuges, and forest lands. Our mothers' and fathers' generation raised the bar for environmental quality by demanding cleaner air and water, so that the Potomac in our own backyard and rivers and lakes across the country now teem again with fish and wildlife.

Our generation faces new conservation challenges. Biodiversity, and the entire fabric of life on Earth, is endangered by the loss and fragmentation of natural habitats. Exotic invasive species are wreaking havoc on native ecosystems. Emerging diseases imperil the health of people and wildlife alike. And there is increasing competition for water, with human needs all too often superseding those of fish and wildlife.

The work of the National Zoo and other conservation organizations is critical in shaping how our generation and the next will respond to these challenges. And we can succeed. Wherever we have given nature a chance and a helping hand, we have seen a reflourishing of wildlife and wild land. The recovery of bald eagles and brown pelicans, the restoration of gray wolves to Yellowstone, and the Zoo's own successful efforts to return golden lion tamarins and black-footed ferrets to the wild are stellar examples. But success depends on more than the good science done here and at other organizations. We need to deepen our understanding of all wild things and develop new approaches to co-existing sustainably with all.

I envision our world as wonderfully interconnected and endlessly enriched by vibrant, abundant wildlife living in intact, healthy landscapes that we are responsible for sustaining, stewarding, and enhancing for our children and grandchildren.

This isn't a new idea. The ancient Greeks of Athens captured this ethic in their city-state oath, which made clear everyone's duty to leave their city and all of its resources not only not less, but better, richer, and more abundant for the next generation. Our duty is no less and, working together, we can fulfill our vision and more.

This marvelous Zoo could not exist without the friendship and support of you, our dedicated FONZ members and volunteers. You have helped to make this a great zoo—and now I hope you will help us to make it the world's best zoo. Let's begin by doubling the number of Friends of the National Zoo! We can do it if each and every one of you reaches out to family members, coworkers, neighbors, and friends, and invites them to join you in supporting their, and the nation's, Zoo.

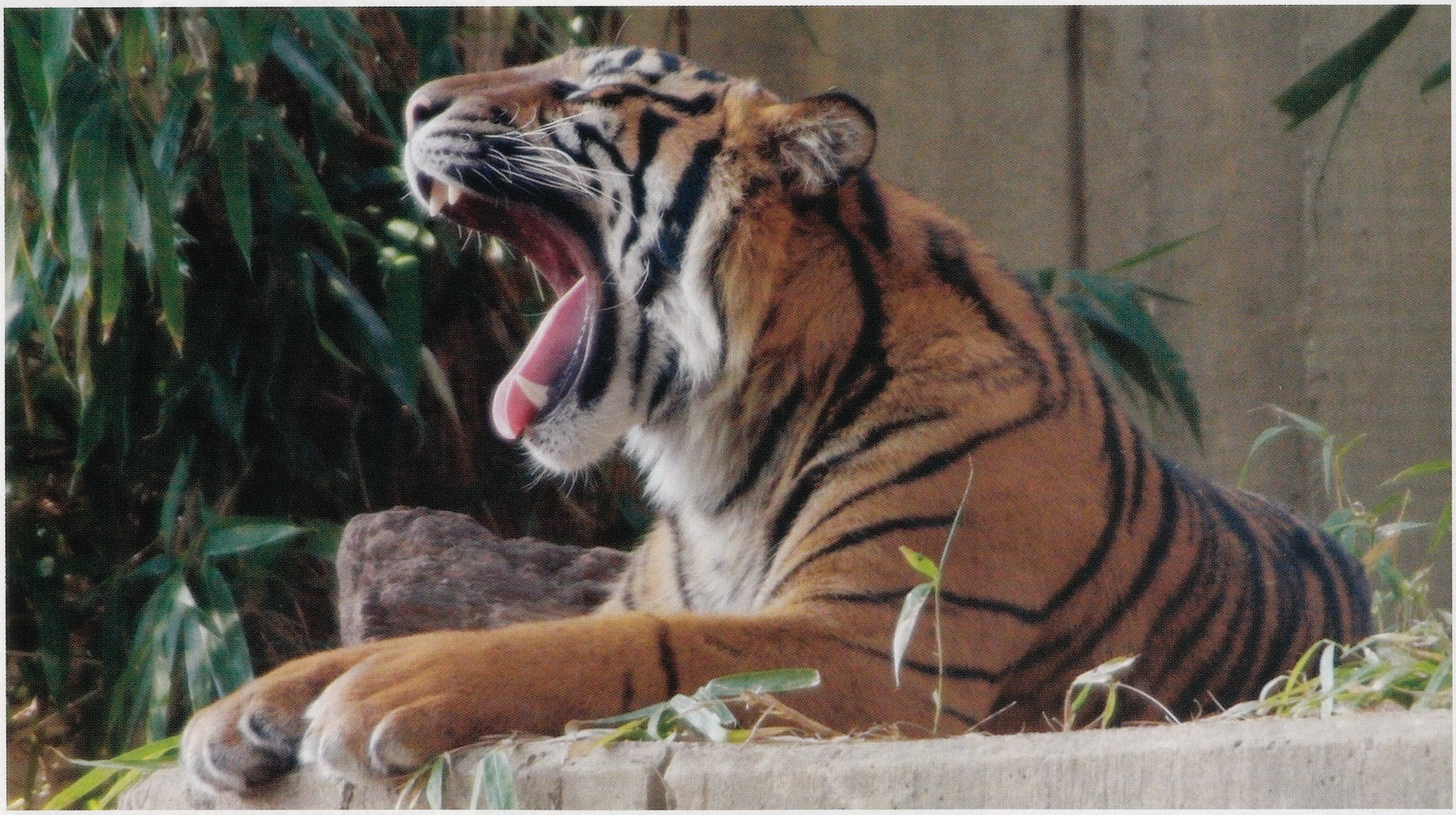
I look forward to meeting you, and to working with you to make our Zoo not only the pride and joy of all residents of and visitors to our nation's capital, but a source of pride for people around the world concerned about the future of wildlife. Thank you for your support.

Sincerely,

John Berry

John Berry
Director, Smithsonian's National Zoological Park

Notes&News



Ann Batdorf/NZP

Sumatran tiger Jalan and his two brothers, born at the Zoo in May 2004, now outweigh their mother.

Animal News

All three of the Smithsonian National Zoo's male **Sumatran tiger cubs** (*Panthera tigris sumatrae*) now outweigh their mother, Soyono. As of October, the smallest cub, Marah, weighed about 215 pounds, and the largest cub, Besar, weighed about 250 pounds, or 70 pounds more than Soyono. They still look much younger and chubbier than their parents, and will continue to grow and develop their muscles until they are five years old.

Now that her cubs are getting bigger, Soyono spends her days outside by herself, but reunites with the boys indoors in the evenings. Male tiger cubs in the wild begin to leave their mothers for several days at a time when they are about 15 months old. By the time they are about two years old, most male cubs leave their mother completely to establish their own territories.

Thanks to FONZ members who donated generously to the 2003 annual appeal, the outdoor **black-tailed prairie dog** (*Cynomys ludovicianus*) exhibit reopened this summer and an adjacent prairie-dog-themed playground will debut in November. The Prairie Dog Playland, which is designed for children from two to six years old, reveals a prairie-dog's perspective on survival. Kids can crawl through a series of tubes that resemble prairie dogs' underground tunnels, and can pop up "aboveground" or look through scopes to scan for large cutouts of predators such as black-footed ferrets and hawks.

Jessie Cohen/NZP

Black-tailed prairie dog.

New Leadership

FONZ is pleased to welcome John Berry as the National Zoo's new Director. Berry's extensive management, public policy, and wildlife conservation experience is a great asset to the National Zoo. Most recently, he was executive director of the National Fish and Wildlife Foundation, and has also served as the Interior Department's assistant secretary for policy, management, and budget, and as director of government and relations and senior policy advisor at the Smithsonian.

Hugh Talman/Smithsonian Institution

New FONZ Board of Directors officers were announced at the annual meeting in October. Robyn S. Kravit is President, James F. Hinchman is First Vice President, Bernard K. Jarvis is Second Vice President, Sue Ruff is Secretary, and Christopher Capuano is Treasurer. Members elected to first, second, or third terms are: Jean-Marie Fernandez, Keith J. Greene, Jeffrey Lande, Vicky Marchand, Anne Nicoll O'Rourke, John F. Ring, Andrew M. Shore, Sheila D. Stinson, Brendan Sullivan, and James C. Weinberg. FONZ Board members' bios are available online at **www.fonz.org/fonzboard.htm**.

Holiday Happenings

Shop National Zoo Stores

Need a perfect gift for the animal lover in your life? Look no further than the National Zoo stores. As a FONZ member, you receive a 20 percent discount at all stores in the Zoo and at its holiday store in Montgomery Mall, which is on the second level next to Sears. Proceeds from your purchase support the Zoo's animal programs, science, and conservation efforts. You can also shop online at **http://store.fonz.org**.

Jingle in the Jungle

December 8—6 to 9 p.m.

Celebrate the holidays Zoo-style at FONZ's holiday event for Young Professionals. Stroll through the Zoo's Amazonia exhibit, where colorful birds perch in rainforest trees and piranhas and giant arapaimas lurk in the waters. Warm up with holiday tunes, hors d'oeuvres, and festive drinks, and browse a stunning collection of Zoo photography presented by the FONZ Photo Club. Prints, cards, magnets, and other items will be available for sale so you can finish your holiday shopping. To purchase tickets or for more information, visit **www.fonz.org/yp.htm**.

photos.com

Children's Holiday Celebration

December 10—12 to 4 p.m.

Have a ball while supporting local charities. D.C.'s only totally improvisational musical children's theater, Now This!, will perform animal-themed songs, comic sketches, and musical fairy tales, and the whole family will enjoy animal demonstrations, games, and educational crafts. Refreshments will be provided. The event is free, but we encourage you to bring a gift for a needy child or shelter animal. Please label children's gifts with the age and sex of the child for whom it is intended. Donated gifts will be distributed to the Alexandria Battered Women's Shelter, The Family Place, Mary's Center, and other local charities. For more information, visit **www.fonz.org/events.htm**.

Lecture

Saving Chocolate, Saving Monkeys

December 1—7:30 p.m.

National Zoo scientist Becky Raboy has spent years studying the behavior and ecology of golden-headed lion tamarins in Brazil. This evening, she will explain how large tropical forests that shade cocoa trees provide shelter and food to these endangered monkeys, and how the tamarins are affected as the forests are increasingly converted into cattle ranches. Lectures are free and are held in the auditorium in the Zoo's Visitor Center. For more information or to RSVP, please visit **www.fonz.org/lectures.htm**.

Volunteer Corner

by Molly Woods

Ann Batdorf/NZP

FONZ volunteers help tend lotus and many of the Zoo's other plants.

When you think of the National Zoo, animals first come to mind. But the Zoo is a park, after all, and is home to thousands of plants, indoors and out. Helping to tend to all that green are FONZ's horticulture volunteers.

Planting, watering, sowing, and weeding along with Zoo staff, horticulture volunteers have plenty to keep them busy, even in the winter. In the colder months, volunteers repot plants and get them ready for spring in the Zoo's climate-controlled greenhouse. The indoor rainforest in the Amazonia exhibit also needs year-round care.

Horticulture volunteers usually come in for two three-hour shifts each month, but the schedule is flexible. FONZ employee Lee Hanley has been volunteering with the horticulture program since 1984. One of the reasons she likes the program is that it fits her schedule well, allowing her to spread out her volunteer time by coming in for a couple hours in the morning once a week.

Program coordinator Caroline Winslow says that for "people who live in apartments and can't get enough plant life, it's a nice opportunity." If you want to get some dirt under your nails, email **caroline@fonz.org** for more information.

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Get the scoop on Zoo scientists' latest groundbreaking discoveries at **www.fonz.org/science.htm**.

Giant panda cub Tai Shan at eight weeks old. Panda lovers around the world celebrated his July 9 birth, and watch him every day on the Zoo website's panda cams.

Jessie Cohen/NZP

TAI SHAN'S *Milestones*

A PHOTO ESSAY

The Chinese zodiac calls 2005 the year of the rooster, but it is undoubtedly the year of the giant panda cub at the Smithsonian's National Zoo. The July 9 birth of Mei Xiang's and Tian Tian's first baby was an epic event for the Zoo and for panda aficionados everywhere, and a triumph for National Zoo science. Most important, the cub's birth gives a little boost to the worldwide population of giant pandas, a species endangered in its native China by habitat destruction and poaching.

We'd like to share with you a scrapbook of milestones in the first months of the cub's life. We've included a few of the hundreds of emails we received from people around the world expressing the hope and joy that the cub, named Tai Shan by his fans, has inspired.

To get the latest updates on the National Zoo's giant pandas, watch Tai Shan and his parents on the panda cams, or to donate to FONZ's Giant Panda Conservation Fund, please visit **www.fonz.org/giantpandas.htm**.

Emails may be edited for length and clarity.

March 10 and 11—A Panda in the Making

Tian Tian made several attempts to mate with Mei Xiang, whose fertile period lasts only two or three days each spring. He was not successful, but Zoo reproduction scientists and veterinarians gave the pandas a second shot at parenthood on March 11, when they inseminated Mei with Tian's sperm. It was nearly four months before anyone knew whether the procedure worked.

Jessie Cohen/NZP

Tian Tian and Mei Xiang attempted to mate on March 10, but were unsuccessful. Mei was artificially inseminated the next day.

PANDA FACTS

Giant pandas (*Ailuropoda melanoleuca*) are endangered. Only about 1,600 live in the wild, and about 160 live in zoos and breeding centers around the world, mostly in China. ● Female giant pandas give birth in the fall and typically bear one cub every two or three years. ● Because giant pandas' reproduction and development are relatively slow, they do not produce offspring quickly enough to replace individuals killed by poachers.

Jessie Cohen/NZP

FONZ volunteer Helen Gaul (left) and assistant curator Lisa Stevens watch Mei and her newborn on video monitors.

Email from Cathy in Balad, Iraq:

We are living and working about 50 miles north of Baghdad and halfway between Baghdad and Tikrit. We work a minimum of 12 hours per day for seven days a week with very little in the way of distraction (other than the occasional "incoming" from insurgents and sandstorms). To say that Mei Xiang and her cub have brightened our days tremendously would be such an understatement.

Every morning, we eagerly wait for your web page to come up so we can check on Mei and her cub. People stop by the office all day asking for a Mei report.

The first day we watched, our hearts went out to Mei. We could see she was just so tired. Every time she tried to lie down, those little squeals started and up she sat. We were right there with her. But when we were finally able to get a small glimpse of the cub, you could have heard the squeals from Iraq if you had not been listening for those coming from Mei's den.

I will never be able to put it into words how much Mei has changed our lives here and what she has come to mean to us. We are all so crazy in love with Mei, her cub, and Tian. What a wonderful job you are doing and what a difference you are making—much, much more than you can imagine.

July 9—A Cub at Last

At 3:41 a.m., a giant panda keeper and a FONZ volunteer behavior watcher heard the squeals of a newborn cub coming from the birthing den inside the Fujifilm Giant Panda Habitat. Staff and volunteers gathered in a nearby room to watch Mei on video monitors, anxious to see how she reacted to her squirming pink baby, which was only 1/900th her size. To their relief, Mei picked it up and gently cradled it in her arms.

News of the cub spread far and wide as the day grew older. TV crews interviewed elated panda fans in Washington, D.C., and journalists filed stories for publications around the world. The cub debuted on the Zoo website's panda cam on July 10 and instantly became an international star.

To allow Mei time to bond with her infant without distractions, the Zoo adopted a hands-off approach. Staff did not immediately examine the cub or determine its sex, but FONZ volunteers began a 24-hour behavior watch to monitor Mei as she learned how to take care of her demanding little cub. Their recorded observations contributed to a growing body of knowledge about giant pandas.

Meanwhile, Tian Tian was the only giant panda on exhibit at the Zoo. He didn't seem to mind being the center of attention, and lolled in his air-conditioned grotto while Zoo visitors streamed by and offered their congratulations.

PANDA FACTS

In the wild, giant pandas give birth in hollow trees or caves to shelter cubs from rain, cold weather, and predators. ● Giant panda fathers do not participate in raising cubs, and are solitary except during mating season. ● The Zoo's cub is one of only four giant panda cubs born in the United States that have survived more than a few days.

Both photos, NZP

By August 1, the cub was beginning to look like a miniature version of its mother (left); as the cub grew bigger, Mei Xiang left more frequently to drink and eat (right).

July 15 to August 1—Baby Puts on a Coat, and Mei Takes a Break

What a difference three weeks of nursing and growing made in the cub's appearance. Although it was a long, lean baby at birth, the cub was starting to develop a little pot belly, thanks to Mei Xiang's high-fat milk. The cub's coat of sparse white hairs had grown thicker and now bore black markings around the eyes, ears, legs, and midsection. It was now unmistakably a giant panda. Its nose, however, wouldn't turn black for a few more months.

Mei seemed to realize that her cub was growing stronger and began to leave him for short periods. On July 15, she took her first drink of water since two days before the cub's birth, and on July 26, just four days after own her birthday, she ate for the first time in 19 days. Fasting is typical for giant panda mothers. Experts in China have observed panda mothers in the wild waiting as long as a month after their cubs' birth before drinking or eating anything.

Email from Janine and her students, Imogen, Chantelle, Lizzie, Lucy, Meghana, Ka Wai, James, and Sam in Stoke-on-Trent, England

We would like you to know that you have a small school in England that visits your website every day to watch the pandas. We love it!

A boy who left my class last year adopted a WWF panda on my behalf. Isn't that an amazing teacher present? Even though he is no longer in my class, he and his classmates call in and follow the pandas every day.*

This gift has prompted me to do lots of work on pandas and other endangered species. The children are fascinated and love learning about conservation. Your website is extremely useful. Thanks.

All lessons are interrupted every time Mei Xiang comes in to feed baby. The children all run to the computer to watch.

Editor's note: You can also adopt a giant panda and other endangered species through FONZ's Adopt a Species program at* ***www.fonz.org/adopt.htm**.*

PANDA FACTS

Adult pandas' fur is thick and is covered with a thin sheen of oil secreted from their skins. The oil repels water and helps the pandas stay dry and warm in the cool, humid mountain climates where they live. Lisa Stevens, the Zoo's assistant curator for giant pandas, says, "Adult panda fur feels dry and coarse. Cub fur is slightly softer."

PANDA FACTS

According to one study, male giant panda cubs tend to grow more quickly than female cubs. As the cub grows, its tail "shrinks" in proportion to the rest of its body. On August 8, its tail was about 14 percent of its total body length, but on September 30, its tail was only 11 percent of its total body length.

NZP

Email from Melissa:

I just wanted to write and tell you how much I have been enjoying watching the mother panda and her baby these past few weeks. It is a glimpse into a world that normally very few people ever have the opportunity of viewing. Mei is such a good mother—yesterday morning, when the cub fussed a bit and Mei looked like she wanted to nap, she responded to the cub and did everything she could to ease the cub's needs instead.

I was fortunate to be online and watching the panda cam when the cub was taken for its most recent vet exam. The keepers and scientists were very gentle when they lifted the cub out of the birthing den and returned him after the exam. Everyone on the panda staff deserves a huge round of applause. You have no idea how much joy and wonder you are bringing to thousands of people who have discovered the pandas' online window!

Zoo staff confirmed that the cub is male at his second exam on August 8. At the time, his fur was still fairly short.

August 2—It's a Boy!

By now, people couldn't wait to find out whether the cub was male or female. One panda-cam watcher emailed to tell us that astrological signs indicated the cub was a male. Others just "had a feeling" that the cub was female. Zoo staff were curious too, but, more important, they wanted to be certain the cub was healthy. At last, the day came to discover the truth.

At about 8 a.m., Mei went into another room to get a drink and eat some bamboo, leaving the cub by himself in the den. Zoo staff closed the door between them, and Mei did not react or seem concerned, so they retrieved the cub and got started.

Associate veterinarian Sharon Deem, animal keeper Laurie Perry, and assistant curator Lisa Stevens conducted the cub's first exam and were "wobbly-kneed with excitement," said Stevens. They found the cub was healthy and quite stocky too. It weighed 1.82 pounds, had a total body length of 12 inches, and its heart rate and respiration were normal. The exam took only nine minutes and answered the question on everyone's mind: The cub is male. A second exam on August 8 confirmed that beyond a shadow of a doubt.

Baby Fat

When he was born, Tai Shan's size was often likened to that of a stick of butter, but he quickly outgrew that comparison thanks to the high-fat milk Mei Xiang provides. He has been gaining an average of 2.5 ounces a day—more than most baby giant pandas in zoos—and he's got a rotund tummy and a "pear-shaped rear end," according to Zoo staff and volunteers. Here's a glimpse at his transformation from butter stick to butterball.

NZP

On August 2, the cub was only a foot long from his nose to the tip of his tail.

July 9—Zoo scientists estimate that at birth Tai Shan was probably about seven inches long, and may have weighed between three and five ounces. He was lean, had only a sparse covering of short white hairs on his pink skin, and looked a little bit like a naked mole-rat.

August 2—At his first exam, Tai Shan weighed 1.82 pounds, and measured 12 inches from his nose to the end of his tail.

August 8—Tai Shan weighed 2.6 pounds and his total length was 14.25 inches at his second exam.

August 18—There was no doubt that Tai Shan was thriving at his third exam. He weighed 4.2 pounds, more than double what he weighed at his first exam, and was 17 inches long.

August 30—At his fourth exam, Tai Shan squirmed so much while Zoo staff were

August 25—Eyes Wide Open

Like many animals, including dogs, cats, and some birds, giant pandas are born with their eyes shut. Staff and volunteers kept their own eyes peeled in hopes of being first to see the cub's peepers.

On August 25, Stevens sent an excited missive to be posted on the website: "They are open! The panda cub's eyes are now open! We just noted this at 4:15 p.m., Day 47." Although there was no way to determine if the cub could see anything yet, some people thought his bright eyes made him look cuter and more alert than ever.

NZP

The cub looked bright-eyed and ready to see the world at his August 30 exam.

PANDA FACTS

Giant panda infants in one study did not react to smells until they were about 18 days old, and did not react to light until they were about one month old. Adult giant pandas' sense of smell is acute.

Email from Sue in Lilitz, Pennsylvania:

Dear Panda Staff,

My heartfelt thanks to all who work so hard to care for the pandas and keep the public updated. I can't describe how meaningful this website has been for me. Back in the early 1970s before we were married, my husband and I visited the National Zoo to see the first pandas there. Through the years we followed their lives, always hopeful for a cub.

My husband died suddenly this spring. In the midst of my grieving a miracle happened: This tiny cub was born. I have been closely following the progress. I was blessed to be watching the day of the first exam, seeing the scurrying feet and hearing the excited voices. I'm sure my husband is closely watching from above, sharing my joy at this miracle.

Know that your hard work has far-reaching effects.

Thank you.

holding him that his head couldn't be measured, but we do know that he weighed 6.2 pounds.

NZP

The cub at his September 8 exam.

September 8—One day shy of his two-month birthday, Tai Shan tipped the scales at 7.5 pounds, and his total length was 21.75 inches.

September 19—Although he was still pretty small—9.6 pounds and 22.5 inches long—Tai Shan's abdominal girth was 18 inches, larger than Scarlett O'Hara's famous 17-inch waist.

September 30—Tai Shan passed the ten-pound mark at his seventh exam. He weighed 11.1 pounds and his total length was 24.74 inches.

Tai Shan no longer resembles the helpless baby that Mei Xiang cradled in her arms on July 9. He's covered in fluffy fur and has the black-and-white markings of an adult panda. Mei Xiang holds him less often and leaves him alone for longer periods of time each day now that he can see, hear, and walk.

Jessie Cohen/NZP

By September 30, the cub had gained more than ten pounds since his birth.

Jessie Cohen/NZP

Giant pandas' claws are much shorter than the claws of black bears, which dig for their food.

September 19—Putting Some Teeth into It

At the cub's sixth exam, veterinarians noticed that his claws were very long and sharp, and detected signs of teeth growing in his gums. His first molars and incisors erupted about two weeks later.

Mei Xiang began to enjoy more time alone as the cub grew, which is normal for giant panda mothers. On September 13, she left the cub for eight hours and spent most of that time resting in the indoor exhibit at the Fujifilm Giant Panda Habitat. On another day, she interacted with Tian Tian through a mesh window on one of her forays into the outdoor yard. The cub slept or rested quietly in the den while she was gone. He had gotten so heavy by then (he weighed 9.6 pounds on September 19) that Mei would have had difficulty picking him up bringing him along with her, anyhow.

PANDA FACTS

Adult pandas have 42 teeth, including flat molars perfect for grinding bamboo, and four canines. Giant pandas belong to the order Carnivora. Although they mostly eat bamboo, they will in rare instances eat bamboo rats (*Rhizomys sinensis*) or musk deer fawns (*Moschus berezovskii*). A 220-pound adult giant panda eats an average of about 27 pounds of bamboo per day.

Email from Patricia in Canton, Georgia

I am one of the millions watching the growth of your panda cub, and what a delight this morning to see him being held by Zoo staff in the latest photo, which put his size in perspective. What a hoot it must be to be able to be involved with his growing up. I do envy all of you!

September 21—Stepping Out

Everyone wanted to see the nearly three-month-old cub take his first step. Some people worried facetiously about whether he could lift his prominent and "pear-shaped rear end" off the ground long enough to do it. Fortunately, he had been building up strength by doing "push-ups"—raising up the front half of his body with his two front legs—and crawling by scooting his body forward with his hind legs.

The moment was brief but exhilarating for the staff, volunteers, and panda-cam viewers who had watched the cub since he was born. He stood up on all four legs, teetered for a moment, then took his very first step. He immediately fell forward and, exhausted by the effort, fell asleep. He took three steps in a row eight days later.

Jessie Cohen/NZP

With help, the cub could stand at his sixth exam.

PANDA FACTS

Giant panda cubs can usually run and climb by the time they are five and a half months old. In the wild, cubs climb trees to play, rest, or hide from predators such as dholes (*Cuon alpinus*) and leopards (*Panthera pardus*).

Jessie Cohen/NZP

On October 3, Mei Xiang gently lifted Tai Shan and moved him from one spot to another in the Fujifilm Giant Panda Habitat.

October 17—A Name of His Own

Panda fans gave the cub an amazing gift for his 100-day birthday—a name. Between August 24 and September 30, they cast more than 202,000 votes at **www.fonz.org** in a Panda Cub Naming Contest. Five Chinese names were provided by the China Wildlife Conservation Association and the National Zoo for voters to choose from. The winner, with more than 88,000 votes, was Tai Shan (pronounced tie-SHON), which means "peaceful mountain."

Now that he has a name and is growing stronger every day, Tai Shan is almost ready to meet all the people who care so much about him. He will probably make his public debut in December 2005. Details will be posted at **www.fonz.org/giantpandas.htm** when they become available.

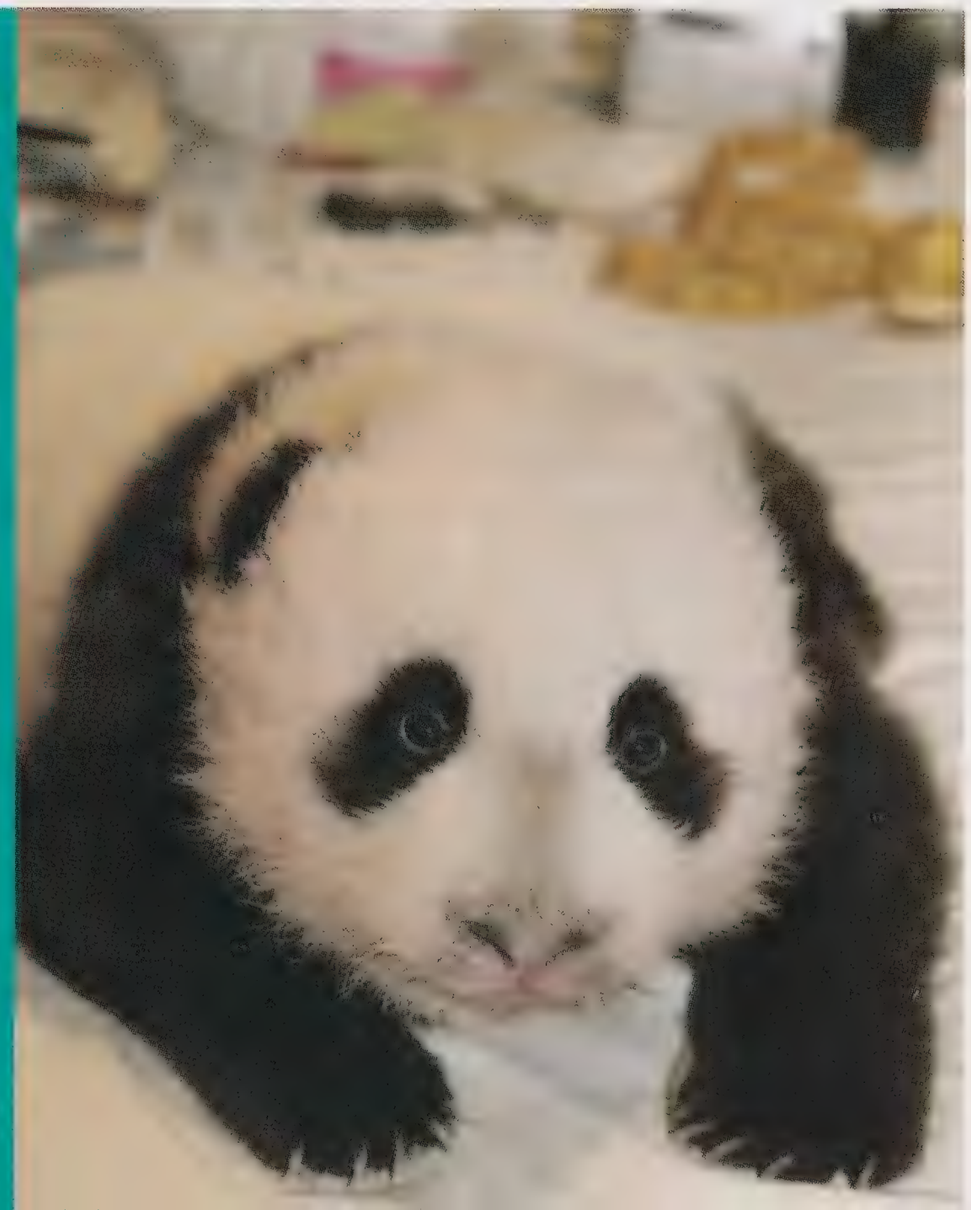
Email from Sue in Colorado Springs, Colorado

I have become semi-obsessed with watching the new baby panda. I find myself logging on in the middle of a hectic day to watch him and it somehow calms and relaxes me.

I have voted for the name Tai Shan, and am hoping that, indeed, will be his name. I have watched him since shortly after his birth, and that name really suits him. He is peaceful and he sleeps his days away, stretching and growing. At ten pounds, he is certainly a little mountain. Thanks for providing this wonderful opportunity to see this wonderful little creature grow.

Tai Shan's Future

He is growing faster than the average giant panda cub in zoos and may take after his grandfather, Pan Pan, as an adult. Pan Pan lives in Wolong, China, and weighs 300 pounds, quite a bit heavier than most adult males, which generally weigh about 250 pounds. • Tai Shan will probably taste his first bamboo in December or January, when he is five or six months old. Sometime between March and his first birthday, he will be completely weaned from his mother's milk. • In the wild, giant panda cubs separate from their mothers when they are between 18 and 24 months old. • Tai Shan will probably go to China, the birthplace of his parents, when he is two.



Jessie Cohen/NZP

Saving **Giant Pandas**, One Person at a Time

BY BILL MCSHEA & MELISSA SONGER

National Zoo scientists train Chinese students how to use remote-trip cameras to learn about giant pandas in the wild. This panda was captured on film at the Wanglang Nature Reserve in Sichuan Province.

The birth of a giant panda cub at the Smithsonian's National Zoo highlights the success of our efforts to enhance the growth of the zoo population of giant pandas. The zoo population, both in North America and in China, represents an insurance policy against the threat of giant pandas going extinct in the wild. Every baby born is a highly visible symbol of progress toward building this insurance policy.

Saving giant pandas and their habitat in the wild, however, has more to do with nurturing people than nurturing cubs. Working in China means climbing steep, forested slopes on cold, rainy mornings and living in sometimes primitive conditions. But it also means working with fascinating people united in their determination to save giant pandas. We and other scientists at the National Zoo have strived to build partnerships at all levels within China's field conservation network. Our training programs and research efforts help us to celebrate and understand wild animals in wild places.

Lessons in Wildlife Management

In 2000, several National Zoo scientists attended a Conservation Breeding Specialist Group workshop in China's Wolong Nature Reserve, one of many giant panda reserves in Sichuan Province. At this meeting, Chinese scientists and managers revealed that what they needed most was technology and training for reserve staff so they could be effective protectors of wild giant pandas.

Universities in North America and Europe offer strong academic programs in conservation biology, wildlife management, and related fields, and staff in our national parks and other protected areas, who usually graduate from one of those programs, are well trained for their jobs. Comparable programs do not exist in Chinese universities.

Staff in upper-level management in Chinese reserves may be college graduates but have most often been trained in business, or increasingly in forestry since China's logging ban was effected in 1998. Lower-level reserve staff may have no specialized training or advanced education at all. As a result, few staff in Chinese reserves are knowledgeable about basic natural history, much less about wildlife surveying techniques, data management, landscape ecology, and other essential tools for managing wildlife and habitat. To help bridge this knowledge gap, National Zoo staff conduct four different types of practical training courses to give staff in panda reserves the skills they need.

For more than 25 years, the National Zoo's Rudy Rudran has conducted wildlife-management training courses around the world. In 2001, he brought his time-tested course to Sichuan, where he utilized a new training center at the Tangjiahe Nature Reserve. Zoo scientist Bill McShea and his colleague Dave Garshelis, a bear specialist from the Minnesota Department of Natural Resources, adapted Rudran's course to focus the lessons on bear ecology and management. Zhu Xiaojian of Peking University and Gong Jien of China's State Forestry

Administration helped immensely in this training course. Both have received training in the United States, but as Chinese, they added a local perspective to our lessons. Two graduate students, Andrew Trent of Virginia Tech and Lui Fang of Peking University, are studying the ecology of black bears in China, and also assist with the training.

Myths about giant panda conservation abound in China. Most prevalent is the belief that pandas are unique and their conservation needs are unlike those of all other bears. Our training aims to dispel this myth and place pandas within the ecological context of other bears. Giant pandas are a species of bear specialized to eat bamboo, which is no more extreme than polar bears' specialization on seals and other meat. Giant pandas need to be managed just as we manage all other bear species, both rare and common, and we can use what we know about bears around the world to study, conserve, and manage giant pandas too.

Whether the focus is giant pandas or black bears, wildlife managers need a toolbox of techniques to do their jobs effectively. These tools, all taught in our course, include survey methods, diet analysis, health screening, radiotelemetry, computer mapping with Geographic Information Systems (GIS), live trapping, and village interview methodologies.

Our most recent course added a relatively new "tool": a dog specially trained to sniff out scats, or feces. Connie, a black Labrador, was trained with the assistance of U.S. Customs staff to locate bear feces; so-called "scat dogs" are much better at finding feces through scent than people who search by sight. Once scats are located by the dog, scientists can collect them and analyze them to determine a bear's diet and read its DNA. Connie proved to have a good nose for scat, and is a big hit with reserve staff.

Monitoring Pandas and More

McShea and Wang Dajun of Peking University have also built a specialized course around surveying and monitoring techniques for large mammals. While our focus is on giant pandas, other large mammals live within giant panda reserves, including takins (*Budorcas taxicolor*), golden monkeys (*Pygathrix roxellana*), golden cats (*Catopuma temminckii*), and Asiatic black bears (*Ursus thibetanus*)—all species of conservation concern. It is important to monitor the status of these species, which all depend on reserve habitats for survival. A central benefit of the course is that each reserve with staff attending receives remote-trip cameras, also called camera traps. Camera trapping, which involves setting out cameras in key areas within reserves to remotely capture on film the animals that pass by them, has become an important tool to determine the presence and density of secretive wildlife. Staff deploy the cameras in their reserves, which are regularly visited by Dajun, while Peking University graduate student Li Sheng does yeoman work to motivate the staff to complete their surveys. This training and technology transfer has produced the first pictures of giant pandas and black bears in several reserves.

Remote-sensing and GIS technology are also essential and relatively new tools for conservation biologists. These tools provide a way to store, display, and analyze spatial data. Panda reserve managers can use GIS to determine the patterns and distribution of pandas within their reserves, allowing better decision making about land use within the parks and better understanding of how changes in the reserve will affect pandas or other species within their parks. Even so, training specifically designed to give wildlife managers the ability to use these tools, and also combines field and computer experience in modules targeted for practical applications, is rare, even in the U.S. To meet this need, the Zoo's Melissa Songer, along with Liu Xuehua of Tsinghao University and Wang Hao of Peking University, are regularly conducting GIS and remote-sensing training courses for wildlife managers in panda reserves. More than 100 people, including staff of panda reserves and forestry departments, and scientists studying pandas, have been trained so far. Many of the panda reserves do not have the computers or software needed to use GIS on their own, so the Zoo is also providing them with computers, GIS software, global positioning system units, and data.

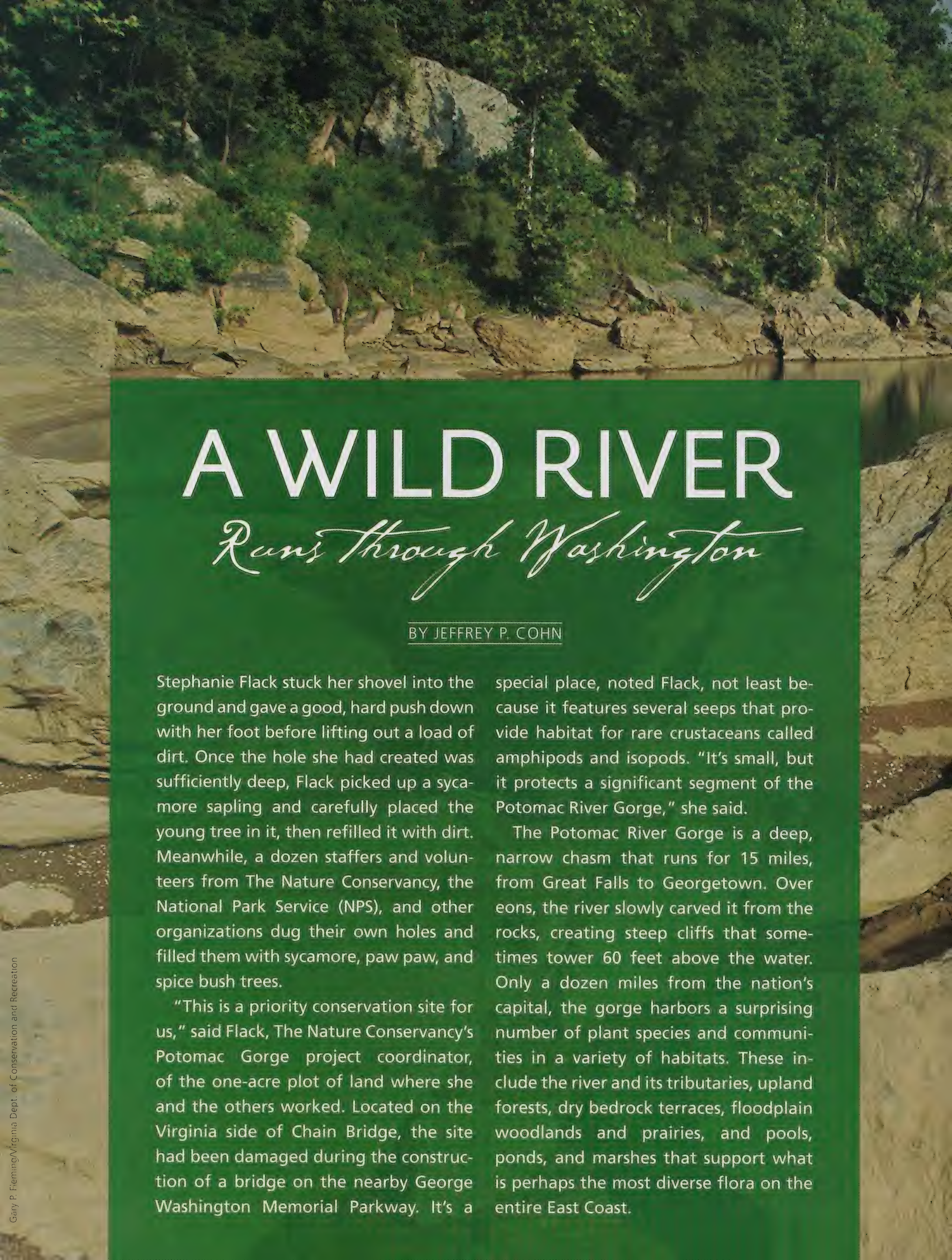
Mapping Habitat

Because giant pandas are endangered and protected in China, there are many restrictions on doing research on them in the wild—for instance, the use of radiotelemetry, a standard tool for studying bears and other animals, is prohibited. Moreover, on-the-ground surveys are extremely difficult to conduct in remote reserves with very rugged topography. Using satellite imagery and modern mapping technology, we are mapping and assessing remaining giant panda habitat, even where ground surveys are challenging. While detailed information on wild giant panda populations is scarce, determining how much suitable habitat is left may be the next-best means of evaluating the conservation status of those populations. Zoo scientists are working with our Chinese partners to gather vegetation data on the ground and using it to help create reliable land-cover maps, estimate how much panda habitat remains, and understand how that habitat is changing. The maps of giant panda habitat they produce will help researchers identify priority areas and aid planning for new protected corridors.

The audience for all of our work in China is Chinese, sometimes reserve staff or administration personnel, and sometimes the greater Chinese public. Ultimately, conservation of giant pandas in China will succeed because Chinese professionals develop the skills to conserve pandas in the wild, and the Chinese public is interested and supports their efforts. And this is happening. Several panda reserves host more than one million visitors a year, and more than 95 percent of these visitors are Chinese tourists interested in their wildlife heritage. National Zoo training courses have reached more than 200 professionals, with staff from reserves throughout Sichuan, Gansui, and Shanxi provinces coming to Tangjiahe for these intensive one-week training sessions. And while our results don't attract the same universal fanfare a baby panda does, we are making progress every day.

What more fun could you ask for?

—Bill McShea is a wildlife ecologist with the National Zoo's Conservation and Research Center (CRC). Melissa Songer is manager of the Conservation GIS Lab at the CRC.



A WILD RIVER
Runs Through Washington

BY JEFFREY P. COHN

Stephanie Flack stuck her shovel into the ground and gave a good, hard push down with her foot before lifting out a load of dirt. Once the hole she had created was sufficiently deep, Flack picked up a sycamore sapling and carefully placed the young tree in it, then refilled it with dirt. Meanwhile, a dozen staffers and volunteers from The Nature Conservancy, the National Park Service (NPS), and other organizations dug their own holes and filled them with sycamore, paw paw, and spice bush trees.

"This is a priority conservation site for us," said Flack, The Nature Conservancy's Potomac Gorge project coordinator, of the one-acre plot of land where she and the others worked. Located on the Virginia side of Chain Bridge, the site had been damaged during the construction of a bridge on the nearby George Washington Memorial Parkway. It's a special place, noted Flack, not least because it features several seeps that provide habitat for rare crustaceans called amphipods and isopods. "It's small, but it protects a significant segment of the Potomac River Gorge," she said.

The Potomac River Gorge is a deep, narrow chasm that runs for 15 miles, from Great Falls to Georgetown. Over eons, the river slowly carved it from the rocks, creating steep cliffs that sometimes tower 60 feet above the water. Only a dozen miles from the nation's capital, the gorge harbors a surprising number of plant species and communities in a variety of habitats. These include the river and its tributaries, upland forests, dry bedrock terraces, floodplain woodlands and prairies, and pools, ponds, and marshes that support what is perhaps the most diverse flora on the entire East Coast.

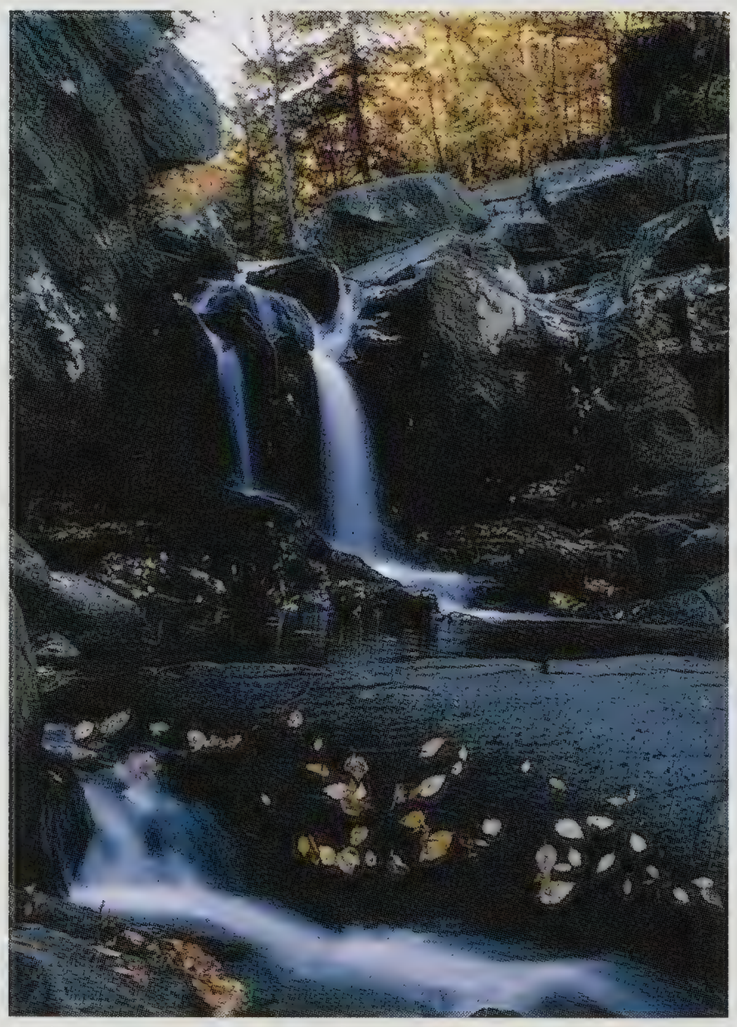
Gary P. Fleming/Virginia Dept. of Conservation and Recreation

The Potomac River may be the wildest urban river in the world. It carved out a 15-mile-long chasm called the Potomac River Gorge, which includes the narrow strip of river shown here, and features bedrock terraces, floodplain forests, waterfalls, and several other ecosystems.

More than 1,400 different plants grow within the Potomac River Gorge, including 300 listed as state species of concern in Maryland, Virginia, or the District of Columbia. Some are common in the gorge, but rare elsewhere. Others are rare species found locally only in the gorge. For still others, the gorge is a last remaining reserve. Beyond individual plants, scientists have identified some three dozen plant communities here, including at least three found nowhere else in the world.

The gorge contains not only a diverse collection of plants, but animals as well. Twenty-six species of amphibians alone can be found here, including 14 salamanders, ten frogs, and two toads. The diversity of plants attracts a variety of bees, butterflies, and other insects as well that, in turn, attract a variety of birds, says Laura Ingram, an NPS resource specialist.

In all, the Potomac River travels 383 miles on its journey from Fairfax Stone in West Virginia to where it joins the Chesapeake Bay at Point Lookout, Maryland. During that course, the river and its tributaries drain nearly 15,000 square miles of West Virginia, Virginia, Pennsylvania, Maryland, and the District of Columbia. It is the fourth-largest watershed on the East Coast and the Chesapeake Bay's second-largest (after the Susquehanna). "This is probably the wildest urban river anywhere in the world," says Matthew Logan, president of the Potomac Conservancy, a local environmental group. "It's unique. It is the nation's river."



Gary P. Fleming

Scott's Run, a secondary stream in Virginia, flows over the rocks of the gorge toward the Potomac.

One reason for the gorge's wildness is its lack of dams: Unlike most other East Coast rivers, only a few, mostly small, dams disrupt the Potomac's flow. Another is the federal, state, and local parks that protect more than half of the gorge. The 25-mile-long, 7,300-acre George Washington Memorial Parkway, which serves Maryland, Virginia, and D.C., and runs alongside the Potomac River, includes two parks in Virginia: the 800-acre Great Falls Park and the 235-acre Turkey Run Park. Also in Virginia, two county parks, Scott's Run and Riverbend, protect another 750 acres near Great Falls. On the Maryland side, the gorge's natural beauty is preserved by the 184.5-mile-long, 19,682-acre Chesapeake and Ohio (C&O) Canal National Historic Park and Cabin John Stream Park. And the Potomac Conservancy owns all or parts of four islands in the Potomac.

"We are a corridor of biodiversity," says Daniel Sealy, deputy director for natural resources of the NPS' Center for Urban Ecology. The Potomac River Gorge and the parkland that protect it are "strips of green spaces surrounded by suburban development. This is the only place [in the Washington, D.C., area] that some plants and animals can live."

The Potomac River Gorge also owes its biological diversity to the unusual hydrology, geology, and geography of the area. Perhaps most important in promoting diversity in the gorge is the Potomac's propensity to flood. The river can carry 1.4 million cubic feet of water per second during heavy floods. Not only is that 100 times the low flow, but it's enough to send water cascading over banks and

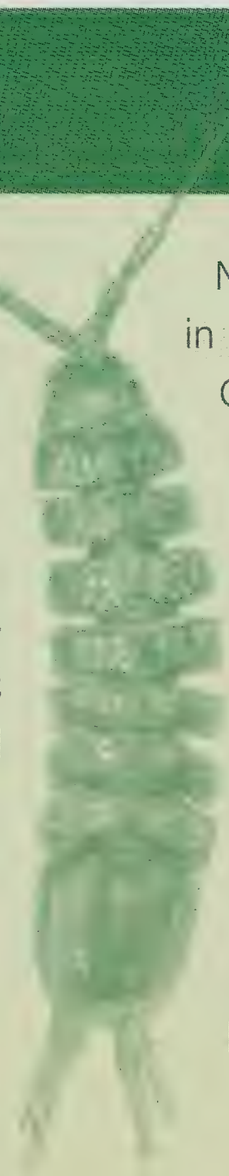
TINY TREASURES

"Oh, Dr. Culver, look, there's a whole mess of them," shouts American University graduate student Laura Casper, who is standing on a hillside between the George Washington Memorial Parkway and the Potomac River. She has found tiny crustaceans called amphipods and isopods in a seep of water oozing down the hill.

Amphipods and isopods are related to crabs and lobsters, but are much smaller; most are less than an inch long. Amphipods resemble shrimp with laterally flattened bodies, while isopods are dorsally ventrally flattened. Both live in a variety of freshwater and marine habitats, including subterranean caves and streams, deep wells, and lake sediments. Those living deep underground are virtually colorless and eyeless. Occasionally, they surface when water is pumped aboveground, especially at natural springs and seeps, where they can be found clinging to the undersides of wet leaves or other plant material.

About 200 species of subterranean amphipods and isopods live in North America. Of those, six are found in the Potomac River Gorge and Rock Creek Park. In North America, only the Edwards Aquifer in Texas has more subterranean amphipods and isopods.

David Culver, a professor of biology at American University in Washington, D.C., is fascinated by these bizarre-looking and mysterious animals. He has been studying them since his college days, despite their lack of beauty or power, and there is still much to discover. No one knows, for example, precisely what



Carolyn B. Gast/NMNH

Kenk's isopod (*Caecidotea kenki*) inhabits at least one Rock Creek Park spring.

tall cliffs. Even lesser floods scour rock terraces, fill old channels and oxbows, rearrange soils and sediments, and wash away years or even decades of old growth. The extensive floodplains on the Maryland side and the hills overlooking the river in Virginia owe their origin to those periodic floods. Other rivers such as the James may flood, but few have the power to create a complex gorge like the Potomac.

Geologically, the Potomac River crosses the "fall zone" that separates the softer rocks of the Atlantic coastal plains from the harder, more erosion-resistant ones of the inland Piedmont Plateau. As a result, the river plunges 76 feet in a series of fast-flowing and dangerous rapids at Great Falls Park. Given the diverse habitats in the Potomac watershed, the river often carries plant seeds from other ecological zones and deposits them in the gorge.

The gorge features what geologists call "bedrock terraces," rock formations that are found in few other rivers. "It looks like someone bulldozed the area," says Scott Southworth, a U.S. Geological Survey research geologist, and adds, "The river did that."

Sedimentary and metamorphic rocks cover the river bottom, and on land they form rocky bluffs and outcroppings that create habitats ranging from crevices, potholes, and ponds to prairies, shrub- and tree-covered woodlands, and forests.

In Great Falls Park alone, independent botanist Cristol Fleming found seven distinct plant communities in a 1993 survey, and the Potomac's bedrock terraces support the most unusual of them all. Most other terraces on the East Coast, such as those on the Susquehanna, are flooded as a result of the rivers being dammed, but most of the Potomac's terraces are on dry ground, creating a perfect environment for small plants such as moss phlox, which has little leaves; lyre-leaved rock cress, which has distinctive, four-petaled flowers; and wild columbine. Two of Virginia's 30 species of goldenrod are restricted in the Washington area to the Potomac River Gorge. Trees include white ash, red maple, and sycamore, as well as a holly rare in Maryland. Sugar maples are more common on the Virginia side of the Potomac than on the Maryland side.

More than 1,400 different plants grow within the Potomac River Gorge

Simpson's Nature Photography

Some of the gorge's wildflowers, clockwise from top left: columbine (*Aquilegia canadensis*), trout lily (*Erythronium americanum*), Dutchman's breeches (*Dicentra cucullaria*), and moss phlox (*Phlox subulata*).

the amphipods and isopods in the Potomac River Gorge eat, in part because they are hard to study in detail. Culver believes that most eat plant detritus: dissolved organic material and/or fungi and bacteria that feed on dead leaves. The amphipods and isopods are in turn eaten by salamanders and by larger amphipods and isopods when they venture too close to the surface.

Most amphipods and isopods have extremely restricted ranges. Kenk's amphipod (*Stygobromus kenki*), for example, is known only to exist in Rock Creek Park, while Hay's Spring amphipod (*Stygobromus hayi*), an endangered species, has only been found in Rock Creek Park and in a spring on National Zoo grounds. Both species live among wet leaves where underground water rises to the surface. During droughts, Culver thinks amphipods and isopods burrow into the ground and go dormant until the rains return.

If undistinguished by their size or beauty or what they eat, amphipods and isopods are useful as barometers of their environment. "They are very sensitive creatures," Culver says. "They live in very stable habitats, so they are very vulnerable to change." That means amphipods and isopods are sentinels for the presence of pollutants in underground water and aboveground seeps.

Still, Culver says, it is remarkable that amphipods and isopods can survive in an urban environment. He worries that new golf courses or storm water drains could change amphipods' and isopods' habitats by draining water from seeps and underground streams. "They are part of the biodiversity of life that should be protected," Culver says.

— Jeffrey P. Cohn

Gary P. Fleming/Virginia Dept. of Conservation and Recreation

Lush floodplain forests like this one thrive on the gorge's bedrock terraces. American sycamore (*Platanus occidentalis*) trees dominate this landscape, and Canada waterleaf (*Hydrophyllum canadense*) covers the ground.

The bedrock terraces are found extensively on Bear and Olmsted Islands, two of the most popular and easily accessed tourist areas within the C&O National Historic Park. The 160-acre Bear Island is the largest of the Potomac's many islands. It was once separated from the Maryland mainland by a side channel of the Potomac that has long since become the C&O Canal. Its woodlands include three species of oak—red, white, and chestnut—plus hickory and hop hornbeam, a shrub-like tree. Olmsted Island, whose plant communities are similar to those of Bear Island, is also separated from the mainland by a narrow channel, but it can be accessed via a pedestrian bridge and boardwalk.

The Chain Bridge flats represent yet another interesting habitat within the Potomac River Gorge. Here, in the area underneath Chain Bridge in the District of Columbia, lies a coastal plain being taken over by a sycamore and maple forest. If the river were left to its own devices here, natural flooding would sweep across the flats and wash away tree saplings, giving the land a prairie character, but a man-made berm now prevents most floods by forcing floodwaters back into the river. The Nature Conservancy is hoping to persuade the U.S. Corps of Engineers to remove the berm and fill in a ditch to allow the flats to flood again.

Washington and its suburbs get 360 million gallons of water a day from the Potomac.

Elsewhere within the gorge, upland forests contain cottonwoods, tulip poplars, black walnut, and chestnut oak, among other trees. Shorter paw paw trees often form thickets because deer will not eat their leaves. "It's important to have an upland forest here because it is mostly gone elsewhere in the D.C. area," says the NPS' Ingram.

Floodplain forests, which cover the lower reaches on the Maryland side of the river, are the most common habitat within C&O Canal National Historic Park. One of these forests can be seen along the wooded Billy Goat Trail, a popular hiking path on Bear Island. Woodland species include sycamore, silver maple, box elder, and red and white oaks. Sycamores, with their peeling bark and whitish winter trunks, are probably the easiest trees to identify, and although most along the Billy Goat Trail are short and thin, sycamores can grow quite large. Wildflowers such as Virginia bluebell, Dutchman's breeches, and toad trillium bloom in the spring. Even rare flowers such as white trout lily and golden Alexanders grow amid the trees.

A large portion of the Virginia side of the Potomac faces north, and its steep slopes and rich soils hold more water than Maryland's south- and west-facing slopes. Consequently, the Virginia side has a much thicker hardwood forest and more open terraces. Its hillsides and deep ravines also discouraged early settlers from clearing land for farming, and most of its land has not been logged since the Civil War. On the other hand, the Virginia side is eroding faster and has fewer bedrock and floodplain terraces than the Maryland side.

Instead of terraces, many of the hillsides on the Virginia side of the gorge feature what Gary Fleming, a vegetative ecologist with the Virginia Division of Natural Heritage, calls "boulder fields." These large areas are strewn with huge boulders and smaller rocks, which break off from bedrock outcroppings as the river erodes the gorge westward faster than it does eastward. Between the rocks grow shrubs such as bladdernut and wildflowers such as jewelweed.

Animals also make their homes in the Potomac River Gorge. Red (*Vulpes vulpes*) and gray (*Urocyon cinereoargenteus*) foxes come down

to the river and canal to drink, white-tailed deer (*Odocoileus virginianus*) browse among the upland woodlands and forests, and raccoons (*Procyon lotor*) and opossums (*Didelphis virginiana*) go just about anywhere in their search for food. But perhaps the most interesting animal story in the gorge lies within the river itself.

The Potomac River once supported millions of common or American shad (*Alosa sapidissima*), fish that are closely related to herrings and live in the ocean but spawn in freshwater rivers. Once the most abundant and commercially important fish in the Chesapeake Bay region, shad formed such thick spawning congregations in the Potomac and other Atlantic coast rivers that it was said one could walk across the water on their backs. Overfishing, polluted waters, and the construction of dams on other rivers nearly spelled doom for shad. The commercial catch dropped from a high of 2.4 million pounds in 1950 to less than 25,000 in 1980. As a result, between 1980 and 1992, commercial and recreational shad fishing were banned on the Potomac.

Aided by these protections, less polluted waters, and the stocking of more than 15 million captive-hatched shad from the Harrison Lake National Fish Hatchery in Virginia, shad have rebounded in the Potomac. The number caught per research net has risen from 15 in the 1990s to 50 in 2002 and 94 in 2003. "That's just a beginning," says James Cummins, associate director for living resources of the Interstate Commission on the Potomac River Basin. "I expect those numbers to grow dramatically. I expect the river to turn silver again."

Tom Stehn/USFWS

White-tailed deer proliferate in the gorge.

While the gorge's shad numbers are on the rise, its plant biodiversity is increasingly challenged by the invasion of non-native plants. These exotics crowd out native species, including rare or unusual ones, and some have been in the gorge for decades. An overabundance of foraging deer also threatens rare plants and plant communities, and the growing number of visitors to the national and local parks in the gorge stresses the natural resources and the park staffs' ability to manage them. Additionally, the region's growing human population is developing more land near the Potomac River and demanding more water from the river and its tributaries.

Development is the greatest threat to the area's biodiversity, but invasive plants are a close second, says Logan. At least 273 non-native plant species now grow within the gorge, including wide-ranging plants such as Japanese stilt grass (also known as *Microstegium*), English ivy, Japanese honeysuckle, garlic mustard, and *Ailanthus* (also called the "tree of heaven"). Some have been carried in as seeds from nearby suburban lawns and gardens by birds, mammals, and the shoes of people, and by the countless creeks and small streams that flow into the Potomac. The problem is greatest along low-lying areas near the river that are subject to more frequent flooding.

To address the problem of exotic plant species, the NPS and private groups such as The Nature Conservancy and the Potomac Conservancy have organized volunteers and staffers who spend weekends removing non-native plants from the gorge and its islands. On Minnie's Island, for example, Potomac Conservancy volunteers and staffers rip out vines, roots and all, and sometimes spray chemicals to prevent their return. The NPS organizes similar efforts along the C&O Canal and George Washington Memorial Parkway. Keeping up with the spread of exotic plants is "a challenge," says Rod Sauter, the C&O Canal's supervisory interpretive ranger.

Toward the same end, the Potomac Conservancy and The Nature Conservancy distribute a "Good Neighbor Handbook" to guide private landowners who want to help preserve the gorge's native biodiversity. It urges people to landscape with native plants and plant species that deer do not eat, reduce the use of fertilizers, and capture and use storm water. It also encourages landowners to consider conservation easements to protect their properties and the gorge from development.

Meanwhile, the number of white-tailed deer residing in the gorge has ballooned in recent years. Biologists estimate there is an average of 85 deer per square mile in the C&O Canal in Maryland and 78 per square mile within the George Washington Memorial Parkway in Virginia, says Scott Bates, an NPS wildlife biologist. More than 40 deer per square mile is usually considered too many, he adds. But given the public outcry over any proposed deer hunt in the area, the NPS has no plans to allow hunting within either the C&O Canal or George Washington Memorial Parkway.

The increasing demand for water from the Potomac and its tributaries is yet another concern to park officials and conservationists. More than five million people live within the Potomac's watershed, some 4.6 million of them in the District and its suburbs. Those figures are up 13 percent since 1990. Washington and its suburbs get 360 million gallons of water a day from the Potomac. As the nation's capital continues to grow, the demand for water is likely to increase too. The result may be insufficient water, especially during droughts and other periods of low flow, to sustain the gorge's natural diversity.

To those problems add the number of people who jog, walk, hike, bike, kayak, fish, or otherwise use the gorge, canal, and river. An estimated 3.5 million people visit the C&O Canal each year, and up to 1.5 million of them go to the gorge. "The park is at risk of being loved to death," The Nature Conservancy's Flack observes. "The gorge is a unique and sensitive place that we all use. It has exceptional natural and cultural resources." Keeping it that way will be a challenge. Z

—Jeffrey P. Cohn is a freelance writer who lives in Takoma Park, Maryland, and specializes in conservation subjects.

Caracals have the longest ear tufts of any cat species, including lynxes and jungle cats. No one knows the tufts' function, but caracals may use them as visual signals when communicating with one another.

BY JENNIFER WINGER

AT THE ZOO:

Caracals,

A Black-Eared Mystery

In abandoned porcupine burrows and rock crevices of dry country, a little-known carnivore hides by day and rises at night to pad about woodlands, savanna, and scrub forest in search of its prey. Also known as the desert lynx, but not a lynx at all, the caracal (*Caracal caracal*) is a wild cat about the size of a cocker spaniel dog.

Caracals inhabit semi-arid climates but rarely true deserts, and prefer open country to dense forests. In these habitats, caracals are widely distributed across Africa, Turkey, the Arabian Peninsula, the Middle East, southeastern and central India, and southwestern Asia.

Most caracals, including the Smithsonian National Zoo's pair, have short tawny or reddish-brown pelage. In the wild their coloration may disguise them as they stalk prey in sands and shrubs; however, caracals' fur color can vary from one region to the next, and even members of the same subspecies may look different. For example, the subspecies *C. c. schmitzi* lives in Israel and India, but the Israeli populations have markedly paler pelage than their Indian counterparts. And, due to melanism—a genetic variation that causes a high concentration of dark pigments in fur, hair, or feathers—caracals in one Iranian population are black except for the silvery hairs on the backs of their ears.

Caracals' common names reflect their wide range and their varied coloration. In Turkish they are called *garahgulak*, meaning "black-ear," for their black-backed and tufted ears; the English word "caracal" is likely a derivative of this word. In South Africa, the caracal is known as the *rooikat*, which means "red cat" in Afrikaans, because its coat takes on a rusty hue in that region. Other names include *sieyh gush*, which is Hindi and Persian, and *ngam ouidenanga*, which means "gazelle cat" in parts of Niger.

Dave Welling

Caracals are nocturnal and have excellent night vision. Their pupils look small and ovular when light is abundant, but grow larger and more circular in the darkness.

The caracal's face resembles that of a short-haired house cat with a touch of the exotic. Its eyes are rimmed with a thin line of black, like an ancient Egyptian queen wearing kohl, and two muted black lines run from the inside corners of its eyes down to its nose. But the caracal's most distinctive feature is its large, triangular ears, which are topped by tufts of black fur that can measure up to 1.75 inches long. A young caracal's ear tufts stand almost upright, but as the cat ages, its tufts gradually droop, and eventually they dangle down like tassels.

Several other cat species have ear tufts, including lynxes and jungle cats and, historically, caracals' taxonomy has been tangled up with theirs. Scientists initially placed caracals in the genus *Lynx*, believing them to be closely related to bobcats and other members of the group; later research suggested caracals were more closely related to housecats, so they became members of the genus *Felis*. Based on recent analyses of caracals' DNA and skull and dental measurements, they are now classified as the sole members of the genus *Caracal*, which has nine recognized subspecies, and their closest living relative is probably the African golden cat (*Profelis aurata*).

A young caracal's ear tufts stand almost upright, but as the cat ages, its tufts gradually droop, and eventually they dangle down like tassels.

A Tale of Two Cats

Like all caracals, seven-year-old Martina and two-year-old Bob, the Zoo's female and male caracals, are solitary animals most of the time. They live in separate enclosures across from Think Tank, and can be seen lounging alone in their leafy green habitats or peeking out from between tall grasses. But in February 2005, for the first time, Zoo keepers brought Martina and Bob together when the American Zoo and Aquarium Association's Species Survival Plan for caracals recommended that the pair breed. According to Jeanne Minor, a great cat keeper at the Zoo, that's when things really got interesting.

Caracals can breed throughout the year, and females are typically fertile for a few days every two weeks. After Martina and Bob were moved to adjacent enclosures and grew acquainted with one another through a mesh screen, Zoo keepers watched Martina for signs that she was ready to mate. When she grew restless, vocalized a lot, and frequently marked the ground with her urine to let Bob know she was receptive, the cats were moved into the same enclosure. The pair engaged in a lot of tactile behavior, from roughhousing to snuggling, but did not produce a litter of kittens.

Minor suspects that in the beginning, the caracals failed to copulate because Bob was inexperienced. He made loud vocalizations, which sounded like emphatic meows, when he approached Martina. While these types of noises are not uncommon in caracals—they sometimes meow, gurgle, hiss, growl, spit, or purr—Minor says Bob's caterwauling turned Martina off. Since then, Bob has learned from his mistakes, and he may yet become a father.

Born to Hunt

Although caracals have a small frame—an adult weighs, on average, between 30 and 45 pounds—their anatomical design makes them ideal predators, and they can take down prey more than twice their own mass. They use their sharp canines to puncture the throats of their prey, and their powerful jaws ensure that their dinners do not escape. Once caracals' prey are dead, they use their carnassials—long, scissor-like molars common to all cats and many carnivorous mammals—to slice through tough tendons and hold slippery meat. Razor-sharp, curved claws also give them an advantage over their prey.

Even more impressive than their killer claws and jaws, caracals' powerful hind legs are the finest tools in their anatomical arsenal. These muscular appendages are longer than caracals' front legs, giving their spine a curious sloped curve. But do not be deceived by caracals' awkward appearance: Their mismatched legs make them sprinters and high jumpers of Olympic proportions, with uncommon horizontal and vertical agility. With remarkable speed, caracals chase down swift animals such as gazelles and hares; from a standing start, they can leap six feet or more into the air to swat birds, and can even change course in midair. According to Minor, caracals' ability to hunt on the ground and in the air is unusual among cats. "These gorgeous and elegant cats are extremely fast with their paws," says Minor, "and they are amazing hunters." Legend has it that one famous caracal in Egypt could take down 15 birds before the rest of the flock could escape.

Caracals can take down prey more than twice their own mass.

Jessie Cohen/NZP

With their sharp claws and incredible agility, caracals snatch low-flying birds out of the air.

In the wild, where hunting skills are literally a matter of life and death, predators need both strength *and* stealth, and caracals have it all. They have the muscle, speed, and agility to overpower their prey, the eyesight and hearing to detect it, and the ability to stalk it unseen and unheard.

Caracals are nocturnal, so their eyes are designed to spot prey in low-light conditions. Like all cats, they have a membrane behind their retinas called a tapetum lucidum that improves their vision by increasing the amount of light reflected onto their retinas. Their pupils also grow larger and more circular at night, which allows more light to enter their eyes. This night vision gives them an edge when tracking prey under the cover of darkness.

To pick up the sounds of prey scurrying around in the dark, caracals use their distinctive ears. Twenty muscles control each large, funnel-shaped ear, while small hairs inside the ears may help caracals pinpoint the location of prey. No conclusive research has determined the purpose of the tufts of hair on the outside. Minor says the cats may be using these tufts as a form of intraspecies communication. "I would love to see more research on how these cats communicate with their ears," says Minor. "They are like lifeguards flapping flags to each other across the beach, but no one knows what they are saying."

Even the bottoms of caracals' paws assist them in their stealthy movements. Tiny hairs between the naked pads on the undersides of their feet deaden their footfalls, muffling the sound of rustling leaves or cracking sticks that would alert their quarry to their presence. Caracals can approach within 16 feet of an animal before ambushing it with a final burst of speed.

Caracals may be efficient killers, but they are not discriminating eaters. They consume a wide variety of birds, such as quail, guinea fowl, eagles, and ostriches, and mammals such as small rodents and hares. Although they most often prey on animals that weigh less than 11 pounds, caracals sometimes take down larger mammals such as antelopes and domestic sheep and goats if given the opportunity. Their diets also vary regionally: In South Africa's Mountain Zebra National Park, for example, caracals commonly feed on springbok, reedbuck, and antelope, but in Botswana, they consume gerbils, mice, and impalas. And in Israel caracals primarily feed on hares, chukar, and desert partridge, but supplement their diet with mole-rats, hedgehogs, and even Egyptian mongoose.

Surprisingly, these formidable hunters are also dainty eaters. They use tiny front teeth to pluck fur and feathers from their prey before they chow down, and are meticulously clean, indulging in frequent tongue baths.

Public Relations

The history of human-caracal interactions is a classic tale of a love-hate relationship. Although they are hardly known in North America outside of zoos and the exotic pet trade, caracals have fascinated people on other continents for hundreds of years. In the 19th

Like many carnivores, caracals use their pronounced canines to puncture and kill prey, and jagged molars called carnassials to shear meat from carcasses.

Left: Jessie Cohen/NZP. Right: Dave Welling

Although they live with their mothers and siblings as kittens, most adult caracals are solitary and come together only to mate.

century, explorer G.T. Vigne witnessed the extreme agility of caracals in his travels in Kashmir, and noted that the speed of the caracal seemed to exceed that of the gray fox and even the cheetah. Although even the swiftest caracal is no match for a cheetah, which can reach speeds of up to 65 miles per hour, Vigne's description reveals the near-mythical status caracals had reached in India at the time.

Impressed by caracals' hunting prowess, Iranian nobility tamed and trained them for generations; Indian princes and potentates kept tame caracals for hunting small game such as hares or for sporting events. Pigeon-catching contests were quite popular as well. The caracals were released into a flock of feeding pigeons, and bets were made as to which cat could knock down the most birds.

In South Africa, caracals are the stuff of legends, but instead of admiration for these agile cats, the tales portray them as ignoble cowards. Author Nick Greaves documents two of these myths in his book, *When Lion Could Fly and Other Tales From Africa*. In "Lion and Caracal," a tale from the Batonka tribe, Caracal is a trickster who pulls the wool over Lion's eyes for a quick laugh, then lives in fear of his stronger cousin for the rest of his days. In "Caracal, Eland, and Jackal," a story passed down by the Bushmen people of the Kalahari, Caracal is similarly fainthearted. Eland, a large African antelope, takes advantage of Caracal's cowardly spirit and outwits him. Caracal's intellectual defeat leaves him quaking with fear and in awe of a beast that he could physically best.

Today, some people consider caracals to be worse than cowards. Although caracals are considered threatened in the Asian portion of their range, they are so abundant in South Africa and Namibia that they have become problematic for people in general and farmers in particular. According to Diane Versteeg, a studbook keeper and population manager for caracals at the Living Desert Zoo in Indian Wells, California, caracals sometimes prey on livestock and consequently suffer from a bad reputation. "In South Africa they look at caracals like we look at coyotes in this country," says Versteeg. Great cat keeper Jeanne Minor, agrees, but also points out that caracals get a bad rap simply because they behave like any other wild animal that hunts to survive. "In their native habitat they are thought of as vermin," says Minor, who notes that in parts of the caracal's range, lions also take livestock but enjoy a much more positive reputation among people. "With lions you can take advantage of tourist dollars, but caracals don't draw tourists, so they are thought of as a nuisance animal."

Can humans and caracals strike a balance between these positive and negative perceptions, and simply co-exist? According to Minor, education and conservation are the first steps. "These are unique cats, but not much is known about them," says Minor. "That needs to change, because we don't want them to disappear." Whether they are so abundant that they are reviled or so scarce that they are revered, these cats need to be to be protected. With ambassadors such as Martina and Bob, caracals may soon have their day in the sun. Z

—Jennifer Winger is a former ZooGoer *intern and a graduate student at the University of Colorado, Boulder.*

Books, Naturally

Fujifilm, preserving more than just memories.

In the Company of Crows and Ravens

John M. Marzluff and Tony Angell. 2005. Yale University Press, New Haven and London. 384 pp., hardbound. $30.

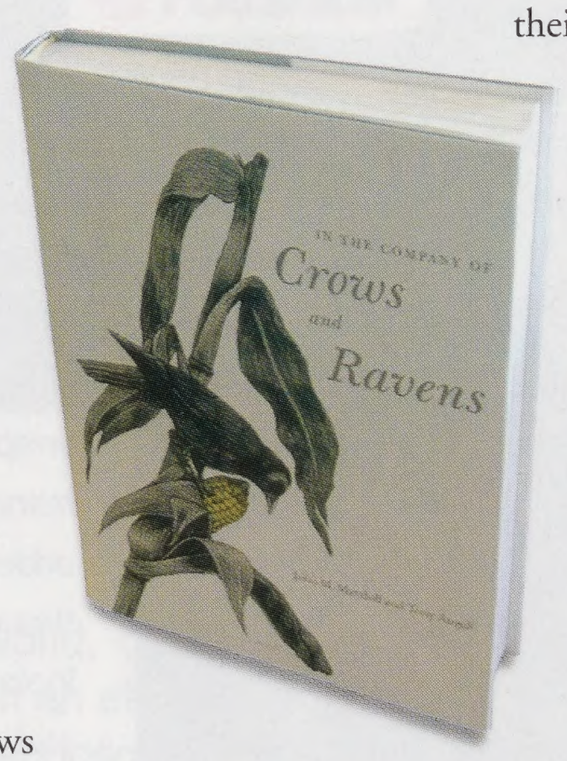
Until West Nile virus swept through in 2002 and killed it, a murder of crows had dominated the skies around my home in northwest Washington, D.C., for more than 15 years. Their preferred roost was the roof of a house kitty-corner across the alley from my backyard. Next door, a pair of mockingbirds invariably nested in a pear tree. And every summer, at least once or twice, I watched a crow sally into the pear tree, snatch an egg or nestling from the mockingbird nest, and carry it back to the roof, seemingly oblivious to the mockingbirds' frantic distress. The parents fearlessly mobbed the cradle robber, but to no avail. Some people might have found these scenes distasteful—mockingbirds, after all, are much cuter than crows—but I miss seeing such wild displays of nature red in tooth and claw in my tame urban habitat.

While urbanization has dealt a death blow to many bird species, American crows (*Corvus brachyrhynchos*) thrive on it. So do several of the other 45 species of birds in the widespread genus *Corvus*, which includes ravens, jackdaws, and the rook. (For simplicity, I'll refer to them all collectively as crows unless a distinction is in order.) At the same time, some other crow species have suffered mightily from human actions. Two species of crows that once lived in Hawaii were wiped out by the Polynesian settlers of these islands, while the third, of which a small number now exists only in captivity, was the victim of more recent habitat loss and introduced diseases. For better or worse, though, relationships between crows and people are ancient and intricate, so much so, the authors of *In the Company of Crows and Ravens* argue, that people influence the evolution and culture of crows and, most intriguingly, vice versa.

Consider the following novel (at least to me) scenario for the origins of our cooperative lifestyle. Crows and ravens lived in the same African habitats where humans evolved. These scavengers would have been constant competitors for meat, but even a little teamwork would have been enough to keep the birds at bay. This then set the stage for ancestral people to evolve cooperative strategies for warding off more formidable competitors like lions and hyenas.

Marzluff and Angell bolster this argument with research findings on how wolves and ravens interact. Whenever wolves make a kill, ravens quickly gather to steal meat. Wolves may lose from five to 45 pounds of food per day to ravens, with larger wolf packs losing less than smaller ones. "Pleistocene humans and wolves faced ravens together, first in Europe and then in North America. As ravens molded human sociality, perhaps they also favored . . . domestication. The wolf, our first domestic species, may have joined ancient families, in part, to chase away ravens."

Apart from these speculations, *In the Company of Crows and Ravens* is replete with fascinating and well-documented stories about crows, many of which highlight their remarkable intelligence and ability to evolve culturally mediated behavior patterns. After parrots, crows are considered the brainiest of birds. As the authors put it, "Mentally, crows and ravens are more like flying monkeys than they are like other birds."



For instance, crows of many species learn to drop nuts and other hard food items like clams from just the right height over just the right hard substrate to break them open. But carrion crows living near a driving school in Japan learned to use cars to do the work for them. These crows wait for traffic to stop at an intersection, fly down and place the nuts in front of the tires of the stopped vehicles, then retrieve the nutmeats from the nuts cracked open when the cars ran over them. Over the last 20 years, this behavior gradually spread beyond the immediate vicinity of the school—and people have begun to help the crows by deliberately running over the nuts on the road!

Marzluff and Angell also recount the diverse and ever-changing place of crows in human affections. At different times and in different places, crows have been revered, respected, feared, and reviled. In 15th- and 16th-century England, crows were appreciated and protected because their catholic tastes in food, which include putrid meat and other spoiled food, helped keep the streets clean. Later, however, when crows in numbers feasted on the corpses of Londoners killed in the great fire of 1666, they were viewed with revulsion and bounties were placed on their heads. (Crows' propensity for feeding on human corpses may explain why a group of crows is called a "murder.") *In the Company of Crows and Ravens* further explores the myriad ways crows have inspired human legends, literature, art, and language—you'll learn, for instance, the origins of such expressions as "eating crow" and "crow's feet."

Finally, after describing the complex, flexible social behaviors and communications of these adaptable birds, Marzluff and Angell suggest how nearly everyone can conduct observational research on whatever crow species happens to live in their vicinity. After reading this book, I'm looking forward more than ever to crows returning to my backyard—although when they do, I'd like to be able to warn those mockingbirds about the perils of nesting in a pear tree so close to a murder of crows.

—Susan Lumpkin

BioAlmanac

by Jennifer Winger

Giving Elephants a Spicy Send-off

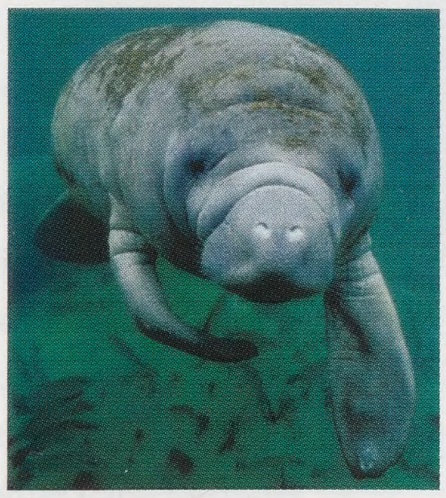
In Asia and Africa, chili peppers are farmers' hottest new weapon against crop-raiding elephants, and it could save lives. Pachyderms looking for a meal or tramping through an area on migration routes can devastate fields of grain, fruit, and vegetables, leaving subsistence farmers without food or income. Both elephants and humans have been killed in conflicts over crops.

Traditionally, farmers guarded their fields by night, and used chemical repellants, fire, guns, and electric fencing to keep elephants at bay. But none of these are foolproof or ecofriendly, so scientists began to look for a low-cost alternative to these methods that would not harm the environment. They discovered that elephants hate the smell of chili peppers.

Now, farmers in several African and Asian countries are planting buffer crops of chilies, rubbing chili paste on inexpensive string fences around their fields, and burning chili powder to repel elephants. Beyond their protective powers, the chilies bring revenue to the farmers, who sell them to companies that make chili jams, sauces, and relishes.

What's in a Name?

From Christopher Columbus to Captain John Smith, sea travelers of yore reported mermaid sightings. Instead of mythical maidens, these men probably saw manatees (family Trichechidae), dugongs (*Dugong dugon*), and now-extinct Steller's sea cows (*Hydrodamalis giga*), marine mammals whose names hint at their resemblance to mermaids.



Manatees, dugongs, and sea cows belong to the order Sirenia; *siren* is the Latin word for a mermaid-like creature that lures sailors to watery deaths with a seductive voice. In Greek mythology, sirens are also temptresses, but they have a woman's head and a bird's body.

Why did seamen mistake beasts for beauties? Perhaps it is because females in Sirenia and female *Homo sapiens* share some physical attributes. Both have mammary glands on their upper bodies near their armpits; the Carib word *manati* means breast or udder. Sailors may also have thought the animals' flippers looked like human hands, and named them after the Latin word *manatus*, meaning "having hands."

The common name for dugongs, which unlike manatees are strictly bottom-feeders and live on the coasts of East Africa, Asia, and Australia, derives from the word *duyung*, a Malay word meaning "lady of the sea."

How Do Flying Squirrels Fly?

Flying squirrels (family Sciuridae) don't fly, they glide from tree to tree. Instead of wings, they have two furred, loose flaps of skin called gliding membranes on either side of their bodies, which attach to knots of cartilage on the squirrels' wrists and ankles. These membranes act like sails to keep the squirrels aloft and to ease them into light and accurate landings, while their long, broad, flat tails function like rudders.

Fact or Fiction: Camels' Humps Store Water

Legend has it that camels (*Camelus* spp.) keep water in their humps to stave off dehydration. Although camels' bodies are adapted to conserve water—they can sustain fluid loss equal to 40 percent of their body weight—their humps actually store up to 80 pounds of fat, which provides them with energy when vegetation is scarce. Camels are not discriminating eaters, and will consume almost any plant that grows in the semi-arid regions where they live, including salty ones. Well-fed camels sport erect humps, while the humps of undernourished camels are shrunken and bowed.

In Season

As we winterize our homes and stock up on snow shovels, American beavers (*Castor canadensis*) are also preparing for the cold months ahead. Beavers live throughout North America; in the highly populated Washington, D.C., area, they build dams in streams, rivers, and even sediment ponds next to housing developments. In autumn, these busy rodents cut down trees such as willow, ash, and poplar, and stockpile them underwater, so they have plenty of tree bark to munch on until springtime brings a fresh crop of the grasses, ferns, and other green plants they love to eat.

Hummingbirds (family Trochilidae) have about 1,000 feathers, fewer than any other bird, while the tundra swan (*Cygnus columbianus*) has the most—about 25,000.

Chilies: photos.com. Manatee: Bruce Coleman Inc./Kike Calvo-Visual & Written. Camel humps: Jessie Cohen/NZP. Hummingbird: Bruce Coleman Inc./Bob & Clara Calhoun.

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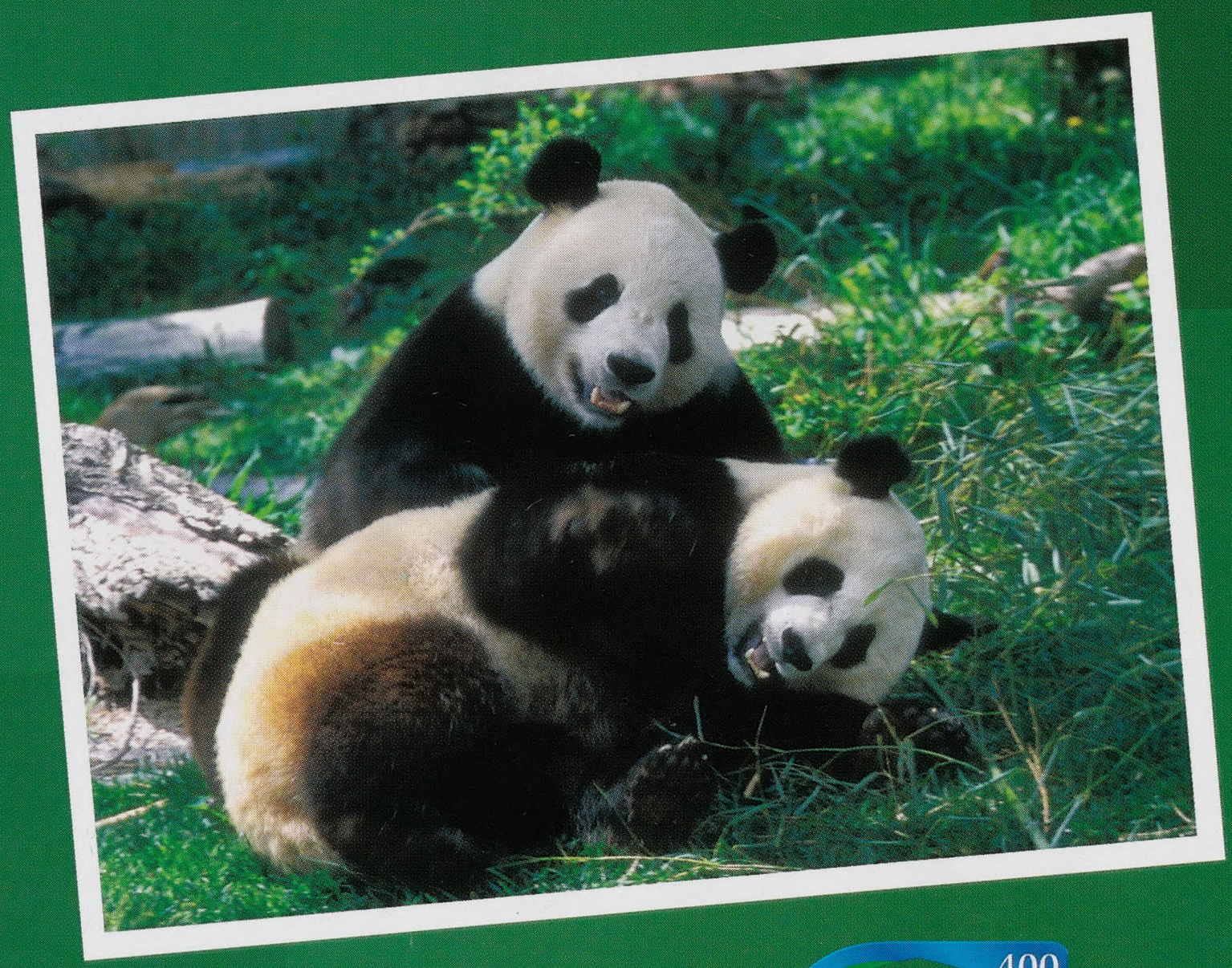

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Among the best recognized, but rarest animals in the world, giant pandas have come to symbolize endangered species and international conservation efforts. In an effort to help protect the giant pandas and secure their future, Fujifilm is proud to be the lead corporate sponsor of the Zoo's giant panda program.

Fujifilm's support helped the National Zoo bring giant pandas Mei Xiang and Tian Tian to Washington, and is assisting the Zoo's experts to develop the scientific knowledge they need to ensure the survival of pandas in the wild. Fujifilm also supports comprehensive conservation education programs designed to help children and adults learn more about giant pandas and the conservation of all wildlife and their habitats.

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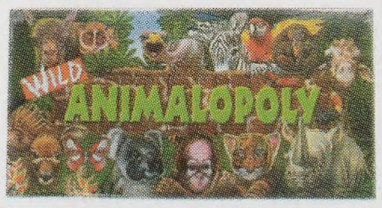

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